CHAPTER 7 - CANADIAN AIRSPACE

INTRODUCTION

This chapter introduces the various classifications of airspace and provides information on the requirements to operate in such airspace. Further information can be found in the Aeronautical Information Publication (AIP).

Canadian Domestic Airspace is divided into two areas: the Northern Domestic Airspace, and the Southern Domestic Airspace.

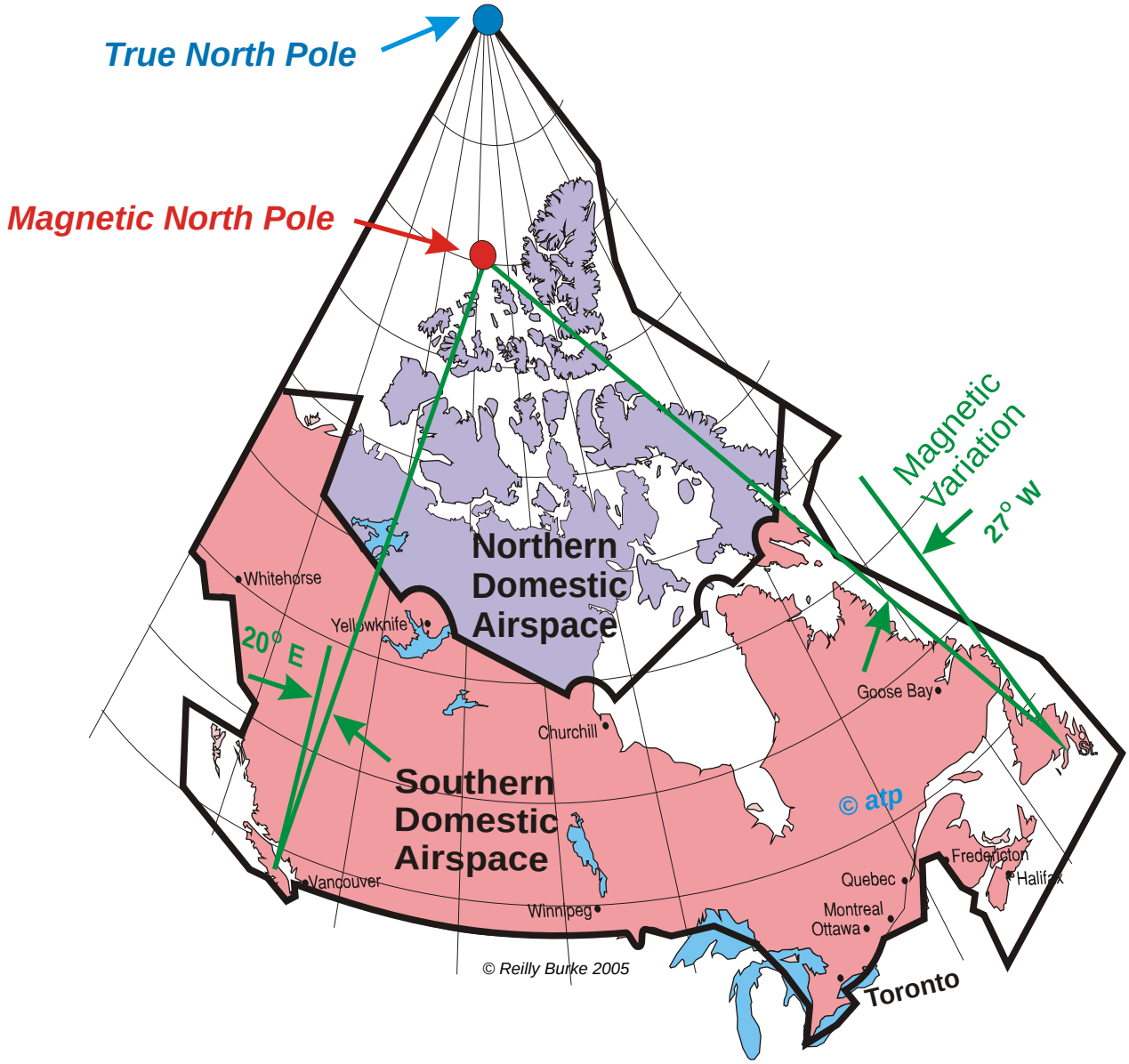

Fig 7-1 Canadian Domestic Airspace

Most of the airspace north of the lower provinces is Northern Domestic Airspace; this is particularly difficult airspace for conventional navigation for three reasons:
(a) it is much colder than the temperate lower regions,
(b) magnetic directions are more difficult to determine, and
(c) the area is sparsely settled and communication with ATS is very difficult.

Within the Northern Domestic Airspace, navigation, runway numbering, and wind direction are based on TRUE track; in Southern Domestic Airspace these are based on the MAGNETIC track. Fig 1 shows the large discrepancy between Magnetic North (shown on your compass) and True North (the axis of rotation of planet earth.

Similarly, altimeter settings in the north, within what is called the Standard Pressure Region, are based on a standard value of 29.92in/Hg, whereas in the southern region (the Altimeter Setting Region) altimeters are set according to the local barometric pressure.

Canadian airspace is bounded by ***Air Defence Identification Zones*** which are shared with the USA.

Within the two major airspace areas there are four types of airspace: controlled, uncontrolled, special use, and other airspace.

Figure 7-2 presents a profile view of the dimensions of various classes of airspace. Figure 7-3 gives the basic weather minimums for operating in the different classes of airspace. Figure 7-4 lists the operational and equipment requirements. It will be helpful to refer to these figures as this chapter is studied. Also there are excerpts from **Visual Navigation Charts** in Chapter 8, Navigation, that will show how airspace is depicted.

CONTROLLED AIRSPACE

Controlled airspace is a generic term that covers the different classifications of airspace and defined dimensions within which air traffic control service is provided in accordance with the airspace classification. Controlled airspace consists of:

Class A
Class B
Class C
Class D
Class E
Class F
Class G

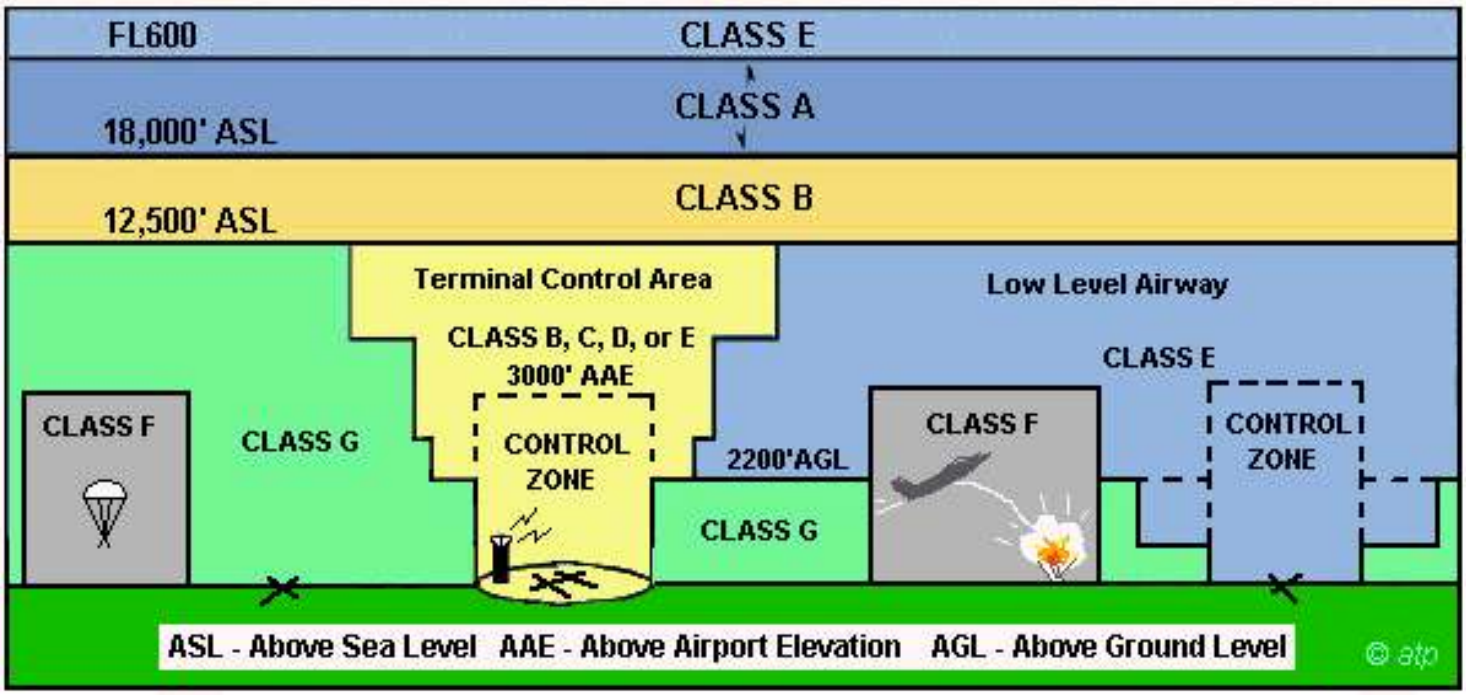

Fig 7-2 Canadian Airspace Structure

Class A airspace

Class A airspace is designated where an operational need exists to exclude VFR aircraft. This is the airspace where large airliners operate. This is the territory of strong pressurization and jet engines since piston engines can't produce the required power in this thin atmosphere. Very few light aircraft are capable of operating in the thin, cold air of Class A airspace.

All operations must be conducted under Instrument Flight Rules and are subject to ATC clearances and instructions. ATC separation is provided to all aircraft.

All aircraft operating in Class A airspace must be equipped with a transponder and automatic pressure altitude reporting equipment.

Class A airspace will be designated from the base of all high level controlled airspace (18,000'ASL) up to and including FL600.

Class B airspace

Class B airspace is designated where an operational need exists to provide air traffic control service to IFR aircraft and to control VFR aircraft. All low level controlled airspace above 12 500 feet ASL or at and above the MEA, whichever is higher, up to but not including 18 000 feet ASL will be Class B airspace. Light pressurization or oxygen is required, and piston engines will need to be turbocharged. This is where most commuter-type aircraft operate.

Operations may be conducted under IFR or VFR. All aircraft are subject to ATC clearances and instructions. ATC separation is provided to all aircraft.

Control zones and associated terminal control areas may also be classified as Class B airspace. *In the USA, Class B Airspace is the airspace around the largest airports. This is the major difference between Canadian & US airspace.*

NOTES:

1: No person shall operate an aircraft in Class B controlled airspace in VFR flight unless:

(a)the aircraft is equipped with:

1. radio communication equipment capable of two-way communication with the appropriate ATS facility, and
2. radio navigation equipment capable of using navigation facilities to enable the aircraft to be operated in accordance with the flight plan, and
3. a transponder and automatic pressure altitude reporting equipment;

(b) a continuous listening watch is maintained by a flight crew member on a radio frequency assigned by ATC;

(c) except as otherwise authorized by ATC, when the aircraft is over a reporting point a position report is transmitted to the appropriate unit or, when so directed by ATC, to an FSS; and

(d) the aircraft is operated in VMC at all times.

2: A person operating an aircraft on a VFR flight in Class B airspace shall operate the aircraft in VMC at all times. When it becomes evident that flight in VMC will not be possible at the altitude or along the route specified, the pilot shall:

(a)request an ATC clearance which will enable the aircraft to be operated in VMC to the filed destination, or to another aerodrome;

(b)where the person is the holder of a valid instrument rating, request an IFR clearance for flight under the instrument flight rules; or

(c)where the Class B airspace is a control zone, request an authorization for special VFR flight,

3: A person operating an aircraft in Class B controlled airspace in VFR flight who is unable to comply with the requirements of the preceding paragraphs shall ensure that:

(a) the aircraft is operated in VMC at all times;

(b) the aircraft leaves Class B controlled airspace:

1. by the safest and shortest route, either exiting horizontally or descending, or
2. when that airspace is a control zone, by landing at the aerodrome on which the control zone is based, and

(c) an ATC unit is informed as soon as possible of the actions taken pursuant to paragraph (b).

Class C airspace

Class C airspace is a controlled airspace within which both IFR and VFR flights are permitted, but VFR flights require a clearance from ATC to enter. This the airspace that surrounds most big-city high-traffic terminal areas and airports. Traffic will consist mostly of airliners, large commuters, and freighters. ATC separation is provided between all aircraft operating under IFR and, as necessary to resolve possible conflicts, between VFR and IFR aircraft. Aircraft will be provided with traffic information. Conflict resolution will be provided, upon request, after VFR aircraft is provided with traffic information.

Traffic information is issued to advise pilots of known or observed air traffic which may be in proximity to their aircraft's position or intended route of flight warranting their attention. Conflict resolution is defined as the resolution of potential conflicts between IFR/VFR and VFR/VFR aircraft that are radar identified and in communication with ATC.

Airspace classified as Class C becomes Class E airspace when the appropriate ATC unit is not in operation.

Terminal control areas and associated control zones may be classified as Class C airspace.
A person operating an aircraft in VFR flight in Class C airspace shall ensure that:
(a) the aircraft is equipped with
    (i) radio communication equipment capable of two-way communication with the appropriate ATC unit, and
    (ii) a transponder and automatic pressure altitude reporting equipment; and
(b) a continuous listening watch is maintained by a flight crew member on a radio frequency assigned by ATC.

A person wishing to operate an aircraft that is not equipped with functioning communication and transponder equipment for VFR flight in Class C airspace may during daylight hours and in VMC, enter Class C airspace provided that permission to enter and to operate within the airspace is obtained from ATC prior to the operation being conducted.

Class D airspace

Class D airspace is a controlled airspace within which both IFR and VFR flights are permitted, but VFR flights must establish two-way communication with the appropriate ATC agency prior to entering the airspace. This airspace is typically found around mid-size urban airports near small cities. There will be a mix of VFR and IFR commuter aircraft, plus training aircraft, helicopters, and seaplanes. ATC separation is provided only to IFR aircraft. Aircraft will be provided with traffic information. Equipment and workload permitting, conflict resolution will be provided between VFR and IIFR aircraft, and upon request between VFR aircraft.

Airspace classified as Class D becomes Class E airspace when the appropriate ATC unit is not in operation.

A terminal control area and associated control zone could be classified as Class D airspace.

A person operating an aircraft in VFR flight in Class D airspace shall ensure that:
    (a) the aircraft is equipped with
        1. radio communication equipment capable of two-way communication with the appropriate ATC unit, and
        2. where the Class D airspace is specified as Transponder Airspace, a transponder and automatic pressure altitude reporting equipment; and
    (b) a continuous listening watch is maintained by a flight crew member on a radio frequency assigned by ATC.

A person operating an aircraft in VFR flight that is not equipped with the required radio communication equipment may, during daylight hours in VMC, enter Class D airspace provided that permission to enter is obtained from the appropriate ATC unit prior to operating within the airspace.

Class E airspace

Class E airspace is designated where an operational need exists for controlled airspace but does not meet the requirements for Class A, B, C, or D. Operations may be conducted under IFR or VFR. ATC separation is provided only to aircraft operating under IFR. There are no special requirements for VFR. Aircraft are required to be equipped with a

transponder and automatic pressure altitude equipment to operate in Class E airspace that is specified as transponder airspace (see RAC 1.9.2). Low level airways, control area extensions, transition areas, or control zones established without an operating control tower may be classified as Class E airspace.

UNCONTROLLED AND SPECIAL-USE AIRSPACE:

Class F airspace

Class F airspace is airspace of defined dimensions within which activities must be confined because of their nature and(or) within which limitations may be imposed upon aircraft operations that are not a part of those activities. Class F activities will typically include military practice areas, fire-bombing activities, parachute jumping, flight training, and hang-glider operations.

Special use airspace may be classified as Class F advisory or as Class F restricted , and can be controlled airspace, uncontrolled airspace, or a combination of both. An advisory area, for example, may have its base in uncontrolled airspace and its cap in controlled airspace. The significance, in this instance, is that the weather minima would be different in the controlled and uncontrolled portions.

When areas of Class F airspace are inactive, they will assume the rules of the surrounding airspace.

Class F airspace is listed on IFR charts and on VNC aeronautical charts. Pilots must still be alert for changes or additions to their favourite airspace.

Charting of Class F Airspace

All designated Class F restricted and advisory airspace is published on IFR Charts, as applicable, and on VFR aeronautical charts.

Each restricted and advisory area within Canada has been assigned an identification code group which consists of the four following parts:

Part (a) the nationality letters "**CY**";
Part (b) the letter "**R**" for restricted area (the letter "**D**" for danger area if a restricted area is established over international waters) or the letter "**A**" for advisory area; and
Part (c) a three-digit number which will identify the area. This number will indicate the Canadian region within which the area lies according to the following table:

101 to 199-British Columbia
201 o 299-Alberta
301 o 399-Saskatchewan
401 to 499-Manitoba
501 to 599-Ontario
601 to 699-Quebec
701 to 799-New Brunswick,Nova Scotia,Prince Edward Island,Newfoundland
801 to 899-Yukon Territory
901 to 999-Northwest Territories (including the Arctic Islands)

Part (d) in the case of advisory areas, the letter **A, F, H, M, P, S** or **T** in brackets after the three digit number will indicate the type of activity within the area as follows:
A-acrobatic
F-aircraft test area
H-hang gliding
M- military operations
P- parachuting
S- soaring
T- training

Exmple: The identification code group **CYA I 13(A)** decodes as follows:

- **CY** - indicatesCanada
- **A** - indicates advisory
- **113** - indicates the number of an area in British Columbia
- **(A)** - indicates acrobatic activity takes place within the area.

All altitudes will be inclusive unless otherwise indicated (e.g., 5 000 to 10 000 feet). To indicate when either the bottom or upper altitude is not included, the words below and above will be placed before the appropriate altitude (e.g., above 5 000 to 10 000 feet, or 5 000 to below 10 000 feet).

Class F Advisory Airspace

Airspace may be classified as Class F advisory airspace if it is airspace within which activity occurs that, for flight safety purposes, non-participating pilots should be aware of, such as training areas, parachute areas, hang gliding areas, military operations areas, etc.
There are no specific restrictions which apply to the use of advisory airspace. VFR aircraft are, however, encouraged to avoid flight in advisory airspace unless participating in the activity taking place therein. If necessary, pilots of non-participating flights
enter advisory areas at their own discretion; however, due to the nature of the activity, extra vigilance is recommended. Pilots of participating aircraft, as well as pilots flying through the area, are equally responsible for collision avoidance.

ATC will not clear IFR aircraft through Class F airspace except if:
(a) The pilot states that he/she has obtained permission from the user agency to enter the airspace;
(b) The aircraft is operating on an Altitude Reservation Approval ; or
(c) The aircraft has been cleared for a contact or visual approach.
IFR aircraft shall be provided 500 feet vertical separation from an active Class F advisory airspace, unless wake turbulence minima is applicable, in which case 1000 feet vertical separation shall be applied.

Pilots intending to fly in Class F advisory airspace are encouraged to monitor an appropriate frequency, to broadcast their intentions when entering and leaving the area, and to communicate, as necessary, with other users, to ensure flight safety in the airspace. In a Class F advisory uncontrolled airspace area, 126.7 MHz would be an appropriate frequency.

NOTE: Military Operations in a Class F airspace may be UHF only!

Class F Restricted Airspace

A restricted area is an airspace of defined dimensions above the land areas or territorial waters within which the flight of aircraft is restricted in accordance with certain specified conditions. Restricted airspace is designated for safety purposes when the level or type of aerial activity, surface activity, or the protection of a ground installation requires the application of restrictions within that airspace.

No person may conduct aerial activities within active Class F restricted airspace unless permission has been obtained from the user agency. In some instances, the user agency may delegate the appropriate, controlling agency the authority to approve access. IFR flights will not be cleared through active restricted areas unless the pilot states that permission has been obtained.

The *User Agency* is the civil or military agency or organization responsible for the activity for which the Class F airspace has been provided, It has the jurisdiction to authorize access to the airspace when it is classified restricted. The User Agency must be identified for Class F restricted airspace, and where possible, it should be identified for Class F advisory airspace.

Any restricted area which may be established over international waters, but controlled by Canadian ATC, will by published as a "**Danger Area**" in accordance with ICAO requirements.

Special purpose areas will be designated restricted areas and identified by the prefix CYR followed by a three digit number which identifies the location of the area.
Restricted airspace may also be designated for elements of existing structure, if its use would facilitate the efficient flow of air traffic.

There are additional methods of restricting airspace, especially on a short-term basis. The issuance of a NOTAM for Forest Fire Aircraft Operating Restrictions, is designed to allow the Minister, by NOTAM, to restrict flight around and over forest fire areas.

It should be noted that airspace which is restricted by NOTAM under Aeronautics Act is not Class F restricted airspace. The airspace has not been classified in accordance with the Airspace Regulations. This distinction is important to those who are charged with the responsibility for restricting airspace, since their actions are governed by the provisions of the Statutory Instruments Act. It is important that pilots not stray into this type of restricted airspace since the penalties are relatively harsh!

Joint Use Airspace

Joint Use airspace is Class F airspace within which operations may be authorized by the controlling agency when it is not being utilized by the user agency.

Class F restricted airspace should be available for use by non-participating aircraft when all or part of the airspace is not required for its designated purpose.

To ensure maximum utilization of restricted airspace, user agencies should be encouraged to make available restricted airspace for the conduct of operations or training of other agencies or commands on ajoint-use basis.

The Air Traffic Control agency may be designated to provide air traffic control or information service within the Class F airspace involved. A controlling agency will normally be assigned when there is joint use of the airspace.

NOTAM

It is permissible to designate Class F restricted airspace by NOTAM if the following prerequisites are met:
(a) the area of restricted airspace is required for a short period of time (i.e. several hours or a few days); and
(b) the appropriate NOTAM is issued at least 24 hours in advance of the area's activation.

Class G airspace

Class G airspace is airspace that has not been designated Class A, B, C, D, E or F and within which ATC has neither the authority or responsibility for exercising control over air traffic.

However, ATS units do provide flight information and alerting services. The alerting service will automatically alert search and rescue authorities once an aircraft becomes overdue which is normally determined from data contained in the flight plan or flight itinerary.

In effect, Class G is all uncontrolled domestic airspace.

Low level air routes are contained within Class G airspace. They are basically the same as a low level airway except that they extend upwards from the surface of the earth and are not controlled. The lateral dimensions are identical to that for a low level airway.

Transponders

Transponders are similar to a 2-node wireless computer network. One node is your aircraft and the other node is Air Traffic Control. ATC can query your node (your aircraft) and ask questions such as "Where are you?" and "What's your altitude?" The transponder promptly replies, and you don't even have to talk. Ths is an important tool for flying in crowded controlled airspace because ATC can see where all the aircraft are, and what they are doing without using up precious radio talk.

Simple transponders display only the position of your aircraft to ATC. ***Mode C*** transponders also display your altitude and registration. If ATC can't figure out which blip is your aircraft, they will ask you to "Squawk Ident" by pressing the button marked "Ident"; this lights up your blip on ATC's screen, and they now know which blip is your aircraft.

Transponder Emergency Codes:

Transponders can also silently broadcast other messages to ATC such as emergency codes. If a plane squawks any of these codes, it officially declares an emergency. Warning alarms will go off at nearby ATC centers and NORAD and the aircraft will be given immediate priority over all other non-emergency traffic.

Three ICAO standard emergency codes used by ATC everywhere are:

* 7700: basic in flight emergency code. will cause alarms to go off at all stations that pick it up and grant immediate attention from air traffic controllers monitoring the area.
* 7600: No radio. This code lets controllers know that a radio failure has occurred on the plane. Planes with a radio failure are given priority over other, non-emergency traffic, and ATC will communicate with them via aviation light signals.
* 7500: hijack code. a plane squawking this code will be given any assistance requested. If the plane alternates between 7500 and 7700 rapidly, it means a request for immediate, armed intervention in the hijacking. If it is not possible for the pilot to set the transponder, they can also report a hijacking by using the phrase "squawking 7-5-0-0" during radio communications.

Squawk codes are 4-digit octal numbers, the dials on a transponder read from 0 to 7 inclusive. Thus the lowest possible squawk is 0000 and the highest is 7777. Because the 7000 series squawks are so sensitive in US and Canadian airspace, care must be taken not to squawk 7500, 7600 or 7700 during a code change. For example, when changing from 1200 (normal VFR squawk) to 6501 (an assigned ATC squawk), you might turn the second wheel to a 5, and then rotate the first wheel ***backwards*** in the sequence 1-0-7-6 to get to 6. THIS IS NOT RECOMMENDED! This would momentarily have you squawking 7500, which will lead to more attention than you desired, up to and including a visit from a fighter jet. Some pilots switch the transponder to "Standby" mode when changing codes, but this removes your blip from ATC's screen, and they'll lose sight of you.

All pilots using transponders must take the time to learn to use the transponder correctly, especially when changing transponder codes to avoid broadcasting a emergency signal! The transponder makes life much simpler for everyone in crowded airspace, and it's a tool to be treated with a great deal of respect.

VFR Weather Minima

When flight visibility is low due to haze or rain, it’s difficult for aircraft to see each other in sufficient time to avoid each other. This is not an important consideration in rural areas, but it becomes vitally important near busy urban airports. Therefore, practical visibility limits have been determined for the different classes of airspace so that converging aircraft have sufficient means to “see-and-avoid”. Fig 7-4 illustrates these minimum conditions for different airspace types. Note that these are absolute minimum - take our word for it: flying in 1 to 3miles visibility can be extremely difficult if you’re trying to see other traffic!

BASIC VFR WEATHER MINIMA		
Airspace	**Visibility**	**Distance from Clouds**
Control Zones & Aerodrome Traffic Zones	Flight: 3 miles; Ground: 3 miles	500' vertical; 1 mi horizontal
Other Controlled Airspace	Flight: 3 miles	500' vertical; 1 mi horizontal
Uncontrolled Airspace - above 1000'AGL	Flight: (Day) 1 mile (Night) 3 miles	500' vertical, 2,000 feet horizontal
Uncontrolled Airspace - below 1000'AGL	Flight: (Day) 2 miles (Night) 3 miles	Clear of cloud

Fig 7-4 Basic VFR Weather Minima

VFR ENROUTE PROCEDURES

Monitoring 126.7 Mhz

Pilots operating Visual Flight Rules (VFR) en route in uncontrolled airspace when not communicating on a Mandatory Frequency (MF) or an Aerodrome Traffic Frequency (ATF), or VFR on an airway should continuously monitor 126.7 MHz. Although monitoring of 126.7 MHz and position reporting during VFR or VFR over-the-top (VFR-OTT) flights is not mandatory, pilots are encouraged to do so for their own protection. Position reports should be made to the nearest FSS where they are recorded by the specialist and are immediately available in the event of search and rescue action. In uncontrolled airspace, report on 126.7 MHz; however, if reporting on another frequency, also broadcast on 126.7 MHz. The following format is recommended.

1. Identification	4. Altitude
2. Position	5. VFR / VFR-OTT
3. Time over	6. Destination

Example:

GATINEAU RADIO, THIS IS CESSNA GOLF INDIA GOLF BRAVO, VFR / VFROTT POSITION REPORT, OVER.
GOLF INDIA GOLF BRAVO, GATINEAU RADIO, GO AHEAD.

GATINEAU RADIO, GOLF INDIA GOLF BRAVO, BY OTTAWA AT FIVE EIGHT, FOUR THOUSAND FIVE HUNDRED, VFR / VFR-OTT, DESTINATION SUDBURY.

It is important on initial contact that the pilot alerts the FSS to the fact that it is a VFR or VFR-OTT position report. It's also helpful (although not required under VFR) if an ETA destination or next reporting point is included.

Acknowledgement of Clearances

Pilots of VFR flights shall read back the text of an ATC clearance when requested by an ATC unit.

Altitudes and Flight Levels - VFR

VFR aircraft shall be operated at altitudes or flight levels appropriate to the direction of flight (track) when in level cruising flight above 3 000 feet AGL. On westerly tracks, aircraft shall cruise at even altitudes plus 500'. On easterly tracks, aircraft shall cruise at odd altitudes plus 500'

Minimum Altitudes and Distances

Low flying is seriously discouraged by the regulators. Low flying airplanes are terrifying to citizens, domestic animals, and wildlife. For practical purposes, an airplane is flying too low when people on the ground can read the registration marks on the wings. Occasionally it's necessary to put numbers on low-flying, so here's the regulation numbers:

An aircraft shall be deemed to be operated over a built-up area or over an open-air assembly of persons where that built-up area or open-air assembly ofpersons is within a horizontal distance of

(a) 500 feet horizontally from a helicopter or balloon; or
(b) 2 000 feet horizontally from an aeroplane.
(c) no person shall operate an aeroplane lower than 1 000 feet above the highest obstacle within 2 000 feet

The AIP Canada lists practical restrictions concerning flying over certain animal farming operations. For example, low flying over turkey farms is prohibited because turkeys become frantic and self-destruct when frightened by aircraft.

The hazards of low flying cannot be over emphasized. For one thing, it is explicitly illegal. In addition to the legal hazards of low flying, an important aspect regarding man-made structures shouldalso be stressed. Hazardous structures such as towers and powerlines are scattered over the entire country. They are NOT all shown on maps! Due to limited control over the construction of man-made structures, there is no guarantee that all such structures are known. Collisions between aeroplanes and structures are common enough to be of concern to all aviators.

Pilot Licencing

No person shall act as a flight crew member unless the person is the holder of the appropriate permit, licence or rating and a valid and appropriate medical certificate; or the person is the holder of an appropriate foreign licence validation certificate. The licence must be carried with the pilot while operating as a crew member. The requirements are listed in the Canadian Aviation Regulations, Part 4, which are available free on this website:

http://www.aerotraining.com

Recency of Experience

No holder of a flight crew permit or licence shall exercise the privileges of the permit or licence in an aircraft unless the holder has successfully completed a recurrent training program within the 24 months preceding the flight.

When a passenger is carried on board the aircraft, the pilot shall have completed five night or day take-offs and five night or day landings, if the flight is conducted wholly by day, or five night take-offs and five night landings, if the flight is conducted wholly or partly by night.

No holder of an instrument rating shall exercise the privileges of the rating unless the holder has successfully completed an instrument rating flight test in an aircraft(or in an approved simulator) within the 12 months preceding the flight, and within the six months preceding the flight, acquired six hours of instrument time and completed six instrument approaches to the minima specified in the Canada Air Pilot in an aircraft, in actual or simulated instrument meteorological conditions, or in a Level B, C or D simulator of the same category as the aircraft or in a flight training device under the supervision of an instructor or qualified pilot.

All the requirements for currency will be met by a standard air carrier Pilot Proficiency Check (PPC).

Night Rating

An aircraft may be operated at night in Visual Meteorological Conditions (VMC) provided the pilot has at least a Private Pilot Licence, and the aircraft is equipped for this type of flight, and the pilot has met the qualifications for night flight contained in the Canadian Aviation Regulations, Part 4. The basic pilot training required includes a total of 10 hours of instrument time (which includes the 5 hours achieved during the PPL training program), emphasizing basic instrument proficiency and the use of the ADF and the VOR.

VFR-over-the-top (VFR OTT)

An aircraft may be operated over cloud in VFR conditions (VFR-over-the-top) provided the pilot has at least a Private Pilot Licence, and the aircraft is equipped for this type of flight, and the pilot has met the qualifications for VFR-OTT flight contained in the Canadian Aviation Regulations, Part 4. The basic pilot training required includes a total of 15 hours of instrument time (which includes the 5 hours achieved during the PPL training program), emphasizing basic instrument proficiency and the use of the ADF, VOR, and GPS. A demonstrated knowledge of Canadian Domestic Airspace, METARs, TAFs, GFAs, PIREPS, SIGMETs, and NOTAMs is also required.